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Personality scores and smoking behaviour

A longitudinal study

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Cherry, N. and Kiernan, K. (1976). *British Journal of Preventive and Social Medicine*, **30**, 123-131. **Personality scores and smoking behaviour: a longitudinal study.** The personality scores at 16 years of age of 2753 people, all members of the National Survey of Health and Development, were related, in a follow-up study, to cigarette smoking behaviour in their young adult years. Survey members who recorded high neuroticism scores were found to be more likely to smoke than those with low scores and, among the smokers, deep inhalers formed the most neurotic group. Extraverts were more likely to smoke than introverts, the mean extraversion score being greatest for the male smokers with a high daily consumption of cigarettes. The personality scores were found to have some power in predicting changes in smoking behaviour. Neurotics and extraverts who had not started to smoke by the time of completing the personality inventory at 16 were more likely than the stable and introverted to take up the habit subsequently. Among survey members who were regular smokers at the time of completing the personality inventory the proportion giving up smoking by the time they reached the age of 25 years was related to consumption level recorded at 20 years and to the personality scores recorded at 16, stable extraverts among the men being most likely to stop smoking.

During the past 20 years there have been a number of studies relating personality measures to smoking behaviour. These studies, of men and women from several countries and of different age groups, have consistently found smokers to be more extraverted than non-smokers (Smith, 1970). Evidence of a relationship between smoking and neuroticism is less conclusive. Although some studies (Lilienfield, 1959; Waters, 1971) have found a relationship, others (Eysenck, 1963; Veldman and Bown, 1969) have not. In none of these studies, however, was the sample followed-up over time, and conclusions about the temporal relationship between smoking and personality are uncertain. The National Survey of Health and Development, a longitudinal study of 5000 young people born in Britain during 1946 and followed-up to the present day, provided the opportunity to relate personality scores (obtained at 16 years) to changes in smoking behaviour during the young adult years. The data collected in this study are of practical interest as they allow groups to be identified that have a particularly high risk of taking up smoking, or a low probability of giving it up.

Method

Population

The National Survey of Health and Development was set up in 1946 to investigate the use of maternity services in Britain. All those born during the first week of March 1946 were included in the initial study and a sample of 5362 children from the original cohort of 13 687 live births has been followed-up into the 1970s. All children whose fathers were either agricultural workers or non-manual were included in the sample together with one in four randomly selected from the births to all manual working class families in the survey week. All multiple and illegitimate births were excluded.

Further details on the objectives, sampling methods, and type of information collected may be found in other publications (Douglas and Blomfield, 1958; Douglas, 1964; Douglas, Ross, and Simpson, 1968).

During the course of follow-up (studies were made at least every two years) personality measures were collected at the age of 16 years (1962) and information on cigarette smoking at ages 20 years (1966) and 25 years (1971).

Smoking Habits

Data on smoking behaviour were collected by postal questionnaire. From the questions asked (Medical Research Council, 1960) three categories were defined: non-smokers (those who had never smoked as much as one cigarette a day for as long as a year), ex-smokers, and present smokers (those who had smoked at least one cigarette a day in the preceding month). Information was also collected on the number of cigarettes smoked, the extent to which these were inhaled, and the age at which the survey member started to smoke.

The results quoted in this paper are those of the smoking habits of the survey members at the age of 25 years. This information was used in preference to the smoking habits at 20 years so as to include those who had taken up smoking later. In practice, very similar results were obtained when the 20-year-old data were examined.

Personality Inventory

The survey members completed the short form Maudsley Personality Inventory (MPI) (Eysenck, 1958) at the age of 16 years. This inventory produces scores on two statistically independent personality dimensions: extraversion and neuroticism. The task for the respondent was to ring answers (Yes ? No) to 12 questions, six relating to extraversion and six to neuroticism. The questions were similar to those used in previously published studies on the relationship between smoking and personality (Eysenck *et al.*, 1960; Arnold-Krüger, 1973).

Losses

It is to be expected in a longitudinal study of this duration that there will be an erosion of the original sample by death and emigration and further losses due to at least temporary non-cooperation. A further difficulty lies in the tracing of survey members in time to meet a deadline, especially in the young adult years when geographical mobility is reaching its peak. Undue pressure on late responders may jeopardize their co-operation in subsequent studies. It was known during the administration of the smoking survey at 25 years that a major study was to take place the following year and it was decided to accept a rather high level of non-response (27%). Many of those not co-operating at 25 years were successfully contacted at 26 years in a study achieving a response rate of 87%.

By the age of 25 years, as far as can be ascertained, there were 4510 members of the follow-up sample alive and living in Britain. Of these 3695 (82%) had completed the MPI at age 16 years and 78% of these completions provided information on smoking at the age of 25 years. Present and past cigar and pipe-smokers were excluded from the main analysis and this left a population of 2753 on whom there was complete information on both cigarette smoking and personality.

In view of the depletion of the sample it was important to know whether bias had been introduced. Of those with missing data on one variable, 76% had information on the other and this was used to explore the possibility of bias due to loss. Table IA shows proportions of survey members with low, medium, and high personality scores for the population with complete data on the MPI and questions on smoking compared with that for which there were only MPI data. The losses in the three grades of each personality dimension were similar, and the size of the χ^2 statistic indicated that there had been no significant differential loss. The population with complete data for both items compared with that for which there were data available only on smoking are shown in Table IB. Again no significant differential loss was apparent. Although no information was available for 24% of the losses, it seems reasonable to conclude from these results that the sample used in this paper was unbiased.

Results

Preliminary examination of the data suggested that there were systematic differences between smokers and non-smokers in their answers to the questions on personality. Survey members who by the age of 25 years, were or had been, regular cigarette smokers gave more positive responses to each of the 12 inventory items than did the non-smokers. When total scores on the two scales were calculated, an increasing proportion of smokers was found with increasing total score, and this was so for both men and women. This initial inspection of the data was felt to be sufficiently encouraging to justify a more detailed analysis of the relationship between smoking behaviour and each personality dimension for this

TABLE IA

EXAMINATION OF DATA FOR POSSIBLE BIAS FROM DIFFERENTIAL LOSS OR REFUSAL PERSONALITY SCORES

Neuroticism Score	No. in Sample	% Without Smoking Data	Extraversion Score	No. in Sample	% Without Smoking Data
0 - 3	975	23·3	0 - 6	1185	23·1
4 - 6	1118	23·1	7 - 9	1241	22·6
7 - 12	1602	20·8	10 - 12	1269	20·9

χ^2 (neuroticism) = 2·85, degrees of freedom = 2
χ^2 (extraversion) = 1·95, degrees of freedom = 2

TABLE IB

EXAMINATION OF DATA FOR POSSIBLE BIAS FROM DIFFERENTIAL LOSS OR REFUSAL SMOKING DATA

Men	No. in Sample	% Without Personality Scores	Women	No. in Sample	% Without Personality Scores
Never smoked ..	601	12·6	Never smoked ..	832	10·3
Ex-smoker	199	14·1	Ex-smoker ..	202	10·4
Present smoker ..	833	14·9	Present smoker	628	13·5

χ^2 (men) = 1·45, degrees of freedom = 2
χ^2 (women) = 3·87, degrees of freedom = 2

population. The first stage of this analysis was to examine mean personality scores for different groups of smokers.

NEUROTICISM

Table II shows the mean neuroticism score for those who were non-smokers, ex-smokers, and present smokers at the age of 25 years. The difference between the scores for non-smokers and present smokers was significant ($P < 0·001$). Although the scores of ex-smokers appeared to be lower than those of present smokers, this could have arisen by chance.

TABLE II

NEUROTICISM (MEAN SCORES) AND CIGARETTE SMOKING AT 25 YEARS

Present Status	Men			Women		
	Mean	SD	N	Mean	SD	N
Never smoked ..	4·66	3·62	525	6·57	3·65	746
Ex-smoker	5·20	3·25	157	7·37	3·51	174
Present smoker ..	5·47	3·54	616	7·40	3·28	535
Whole sample	5·11	3·56	1298	6·97	3·52	1455
No of cigarettes a day						
1-10	5·59	3·59	211	7·16	3·46	278
11-20	5·46	3·50	299	7·73	3·09	226
21+	5·39	3·54	70	7·23	2·86	31
Unknown	5·08	3·66	36	—	—	—
All present smokers ..	5·47	3·54	616	7·40	3·28	535
Degree of inhalation						
Slight	4·58	3·38	74	6·86	3·49	125
Moderate	5·05	3·48	347	7·53	3·14	318
Deep	6·68	3·47	172	7·59	3·37	73
Unknown or none ..	5·52	3·38	23	8·21	3·66	19
All present smokers ..	5·47	3·54	616	7·40	3·28	535

Table II also shows the smoking group subdivided according to numbers of cigarettes smoked a day. Women smoking 11 to 20 cigarettes were found to be significantly ($P < 0.05$) more neurotic than those with a lower consumption, but no such difference was found for those consuming more than 20 cigarettes a day. No significant trend* was found between consumption and neuroticism for the men in the sample.

The present smokers were also grouped by the extent to which they inhaled. The mean neuroticism score increased with depth of inhalation for both men and women and both these trends were found to be significant (men, $P < 0.001$; women, $P < 0.02$).

Extraversion

The finding that smokers are on average more extraverted than non-smokers is well established (for example, Smith, 1970) and this was again confirmed for men and women. The higher mean scores for smokers in Table III were found to be significant at $P < 0.001$ for men and $P < 0.01$ for women. Ex-smokers had the highest mean extraversion scores of the three smoking groups, but their scores were not significantly higher than those of the present smokers.

Women who smoked many cigarettes recorded, on average, higher extraversion scores than women who smoked only a few. This trend was found to be significant ($P < 0.02$). Heavy smokers among men also had the highest extraversion scores and the lighter smokers the lowest scores, but this could have arisen by chance.

The relationship between extraversion scores and inhalation is also shown in Table III. Men who inhaled deeply had the lowest mean extraversion scores while the lightest inhalers had the highest. This trend was significant ($P < 0.01$). No such trend was in evidence for women in the sample.

Multi-Factor Analysis

Results on the relationship between smoking behaviour and personality have often been presented in terms either of mean personality scores or of correlations. Although these methods of presentation can indicate the existence of some statistical relationship, examination of the means is an unsatisfactory way of answering questions about the form this relationship takes. High mean scores, for example, may result either from a heavy concentration of smokers among a fairly small group of very neurotic or very extraverted young people, or from a steady increase in the proportions smoking with increasing personality score. A second possibility is that the two personality scores do not

*The statistical significance of all trends in this paper were tested by Kendall's rank-order correlation coefficient (tau)

Table III

EXTRAVERSION (MEAN SCORES) AND CIGARETTE SMOKING AT 25 YEARS

Present Status	Men			Women		
	Mean	SD	N	Mean	SD	N
Never smoked	7·78	2·66	525	7·31	2·85	746
Ex-smoker	8·52	2·50	157	8·16	2·91	174
Present smoker	8·24	2·65	616	7·96	2·80	535
Whole sample	8·09	2·65	1298	7·65	2·85	1455
No. of cigarettes a day						
1-10	8·18	2·81	211	7·76	2·90	278
11-20	8·19	2·60	299	8·14	2·68	226
21+	8·61	2·45	70	8·48	2·72	31
Unknown	8·36	2·54	36	—	—	—
All present smokers	8·24	2·65	616	7·96	2·80	535
Degree of inhalation						
Slight	8·65	2·49	74	8·10	2·77	125
Moderate	8·28	2·70	347	7·92	2·83	318
Deep	7·94	2·61	172	8·25	2·54	73
Unknown or none	8·61	2·55	23	6·58	3·24	19
All present smokers	8·24	2·65	616	7·96	2·80	535

operate independently in relation to smoking but that the high mean neuroticism scores and high mean extraversion scores result from a single group of smokers with high scores on both dimensions. The next stage of the analysis was designed to investigate these possibilities.

Table IV shows the proportion of survey members who, at 25 years, had at some time been regular smokers, grouped by their extraversion and neuroticism scores. It is apparent that there is, in general, an increase in the proportion of smokers with increasing extraversion and neuroticism score, both for men and women, and that the two personality scores appear to operate independently. These conclusions were tested statistically by a method of analysing proportions developed by Dyke and Patterson (1952). In this analysis observed proportions were transformed, using the logistic function, and an additive model was fitted to the transformed proportions. The method was applied separately to the observed data for men and women, and then, in a single analysis, to the data for the whole sample. Both neuroticism and extraversion were found to contribute ($P < 0{\cdot}01$) to the proportions of smokers in the separate analyses for men and women, and the model fitted was in both instances found to be a good one. In the combined analysis, including sex as a third factor in addition to neuroticism and extraversion, all three factors were found to be strongly related to smoking ($P < 0{\cdot}001$) with no significant interaction effects.

Temporal Relationship Between Smoking and Personality

The observation that personality scores are related to smoking is, in a cross-sectional sample, somewhat ambiguous. Personality changes may have taken place after smoking began, or some single event during adolescence or adulthood could have resulted in the onset of both increased personality score and smoking. A longitudinal study allows the temporal relationship between personality and smoking to be examined in more detail.

Personality scores were collected when the members of the survey were aged 16 years. By the time they were 25 years old more than half the men and one-third of the women had at some time smoked. The personality scores of the survey members were

TABLE IV A

PROPORTIONS OF SURVEY MEMBERS WHO, BY 25 YEARS, HAVE EVER BEEN REGULAR SMOKERS, ANALYSED BY GROUPED PERSONALITY SCORES

OBSERVED PROPORTIONS

Extraversion	Men				Women			
	Neuroticism				Neuroticism			
	Low (0-3)	Mid (4-6)	High (7-12)	Total	Low (0-3)	Mid (4-6)	High (7-12)	Total
Low (0-6)	0·48 (103)	0·52 (137)	0·60 (142)	0·54 (382)	0·30 (80)	0·45 (119)	0·46 (299)	0·44 (498)
Mid (7-9)	0·52 (165)	0·61 (127)	0·68 (135)	0·59 (427)	0·31 (84)	0·41 (136)	0·50 (271)	0·44 (491)
High (10-12)	0·57 (177)	0·71 (160)	0·66 (152)	0·64 (489)	0·45 (95)	0·59 (153)	0·65 (218)	0·59 (466)
Total	0·53 (445)	0·62 (424)	0·65 (429)	0·60 (1298)	0·36 (259)	0·49 (408)	0·53 (788)	0·49 (1455)

TABLE IV B

PROPORTIONS FITTED BY LOGIT MODEL

Extraversion	Men			Women		
	Neuroticism			Neuroticism		
	0-3	4-6	7-12	0-3	4-6	7-12
0-6	0·44	0·55	0·60	0·32	0·42	0·47
7-9	0·48	0·59	0·64	0·36	0·46	0·51
10-12	0·59	0·69	0·73	0·46	0·57	0·61

Goodness of fit χ^2 (estimates from B to observed data in A) = 11·5 with 12 degrees of freedom

related (Table V) to the age at which smoking began, those who started after 16 years appearing to be less extraverted and less neurotic than those who took up smoking at an earlier date*. The clear trends apparent in Table V were all significant at $P < 0{\cdot}001$ although Student's t tests of the differences between individual pairs of means showed that not all pairs were statistically significant when examined in isolation.

The young men and women who started smoking after the age of 16 years are of particular interest in attempting to establish whether the personality dimensions preceded smoking behaviour. The scores in Table V, measured before the onset of smoking, suggest that potential smokers had high neuroticism and extraversion personality scores before taking up the habit.

Predicting Smoking Changes from Personality Scores

Presented with recent personality scores and current smoking behaviour it is of interest to know whether the scores can be used to predict likely changes in future smoking patterns. It may be, for example, that groups can be isolated that have a good probability of giving up smoking, or that there are groups of present non-smokers with personality scores that suggest they are likely to take up smoking unless there is positive intervention. For this analysis the survey members were subdivided, as in Table V, into those known to have started smoking by the time they were 16 years old and those who had not.

Starting to Smoke

The discussion on the implications of the data in Table V indicated that personality scores might be valuable in predicting which of the non-smokers (at 16 years) would take up the habit by 25 years. A logit analysis was carried out parallel to that in Table IV, but including only those who had not been regular smokers by their seventeenth birthday. The analysis for both men and women (Table VI) indicated that neuroticism, extraversion, and sex were, as in the whole sample, related to the onset of smoking ($P < 0{\cdot}01$ for each factor); however an interaction effect was also observed, men who were both extremely neurotic and extremely extraverted smoked significantly less than would have been predicted. Although similar trends were observed for men and women, statistical tests showed that only those for the women were strong enough to suggest that they were unlikely to have arisen by chance.

Giving up Smoking

681 members of the sample had started to smoke at 16 years or earlier and for this group the problem was to identify those who had given up before they reached the age of 25 years. It was apparent that many of those who had given up smoking had smoked only briefly, had not inhaled, and had had a low consumption. It was decided to restrict the analysis to the group who had started by 16 years, had continued smoking to 20, and who, at 20 years, had reported that they inhaled. This gave a group of 478, a rather small sample, but one in which any positive results might be held to be unambiguous. Because of the small size, however, only two categories, 'high' and 'low' on each personality dimension were defined.

Examination of the data suggested that two factors, extraversion and daily consumption, were related to giving up smoking for both men and women. The observed data are shown in Table VII. A logit analysis showed that, for men and women

*Those who started smoking by 16 years were found to smoke more cigarettes a day by the age of 25 years than those who started smoking later; they were also more likely to inhale deeply

TABLE V
MEAN PERSONALITY SCORES BY AGE AT STARTING TO SMOKE

Age At Starting To Smoke	Men					Women				
	Neuroticism		Extraversion		N	Neuroticism		Extraversion		N
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Never smoked ..	4·66	3·12	7·78	2·66	525	6·57	3·65	7·31	2·83	746
Started after 16 years	5·01	3·38	8·18	2·71	364	7·29	3·34	7·87	2·82	427
Started at 16 years or earlier ..	5·73	3·51	8·40	2·55	399	7·56	3·33	8·21	2·83	282
Whole sample* ..	5·09	3·56	8·09	2·65	1288	6·97	3·52	7·65	2·85	1455

*Excluding 10 men whose age at starting to smoke was unknown

TABLE VI A

PROPORTIONS OF MEN AND WOMEN WHO HAD NOT SMOKED AT 16 YEARS BUT WHO HAD TAKEN UP SMOKING BY 25 YEARS, ANALYSED BY GROUPED NEUROTICISM AND EXTRAVERSION SCORES

OBSERVED PROPORTIONS

Extraversion	Men				Women			
	Neuroticism				Neuroticism			
	Low (0-3)	Mid (4-6)	High (7-12)	Total	Low (0-3)	Mid (4-6)	High (7-12)	Total
Low (0-6)	0·33 (80)	0·32 (97)	0·45 (103)	0·37 (280)	0·23 (73)	0·39 (106)	0·34 (241)	0·33 (420)
Mid (7-9)	0·36 (125)	0·42 (86)	0·44 (77)	0·40 (288)	0·18 (71)	0·28 (111)	0·40 (226)	0·33 (408)
High (10-12	0·43 (133)	0·53 (100)	0·41 (88)	0·45 (321)	0·34 (79)	0·44 (112)	0·50 (154)	0·44 (345)
Total	0·38 (338)	0·42 (283)	0·43 (268)	0·41 (889)	0·26 (223)	0·37 (329)	0·40 (621)	0·36 (1173)

TABLE VI B

PROPORTIONS FITTED BY LOGIT MODEL

Extraversion	Men			Women		
	Neuroticism			Neuroticism		
	0-3	4-6	7-12	0-3	4-6	7-12
0-6	0·31	0·38	0·42	0·25	0·32	0·35
7-9	0·32	0·40	0·44	0·27	0·34	0·37
10-12	0·41	0·50	0·53	0·35	0·43	0·47

Goodness of fit χ^2 (estimates from B to observed data in A) = 17·6 with 12 degrees of freedom

TABLE VII

PROPORTION OF MEN AND WOMEN, SMOKING AT BOTH 15 AND 20 YEARS, WHO HAD GIVEN UP CIGARETTES BY THE AGE OF 25, ANALYSED BY CONSUMPTION AND EXTRAVERSION

Daily Cigarette Consumption At 20 Years	Extraversion At 16	Men		Women		Both	
		Observed Proportion	N	Observed Proportion	N	Observed Proportion	Proportion From Logit Analysis
1-10	Low (0-8)	0·18	40	0·21	43	0·19	0·18
	High (9-12)	0·38	37	0·29	51	0·33	0·34
11-20	Low (0-8)	0·10	78	0·15	48	0·12	0·13
	High (9-12)	0·27	78	0·26	47	0·26	0·26
21+	Low (0-8)	0·00	21	0·17	6	0·04	0·04
	High (9-12)	0·12	25	0·00	4	0·10	0·10

Goodness of fit χ^2 (estimates from final column to observed data) = 0·3 with 2 degrees of freedom

together, both these factors were indeed statistically related to giving up smoking ($P < 0{\cdot}01$), extraverts and those with low consumption being more likely to give up the habit. The sex of the survey member did not contribute to the analysis of whether or not the habit was given up. Examination of the relationship of neuroticism with giving up smoking showed no consistency for women but for men a fairly consistent trend was apparent (Table VIII), neurotic men being less likely than stable ones to stop smoking. This trend was found to be significant ($P < 0{\cdot}05$) in a logit model including both extraversion and consumption. The model in this analysis was found to be a good fit to the observed data, and can be used (as in Table VIII) to obtain estimates of the probability that different groups of men will give up smoking. From this model 47% of male stable extraverts with a low consumption are predicted to give up smoking by the time they are between 20 and 25 years old but this proportion decreases to only 2% for the neurotic introverts with a high daily consumption of cigarettes.

Discussion

The data presented in this paper have extended previous discussions about smoking and personality in a number of ways. They have confirmed that, in a large and geographically scattered sample of normal young men and women, smokers are both more neurotic and more extraverted than non-smokers. They have shown too that the relationship between smoking and personality is not confined to the group with extreme personality scores, but that the exceptionally stable or introverted smoke less than those with moderate scores on these personality dimensions. Furthermore, the independent and additive nature of the personality effects has been demonstrated. It has also been shown that scores at one age are related to changes in smoking behaviour in the following years, neurotic extraverts starting to smoke and stable extraverts being most likely (at least among the men) to give up. Finally, it seems clear that the personality factors examined in this paper are related in different ways to smoking among young people, inhalers being more neurotic and large consumers more extraverted; similar results were reported by Eysenck *et al.* (1960) and Eysenck (1963). The results seem to establish beyond dispute that statistical relationships exist between smoking and personality. In assessing their practical applications, however, it is as well to examine any possible restrictions on their interpretation.

The most likely practical use for data on the relationship between smoking and personality would be either in the allocation of patients to different types of smoking clinics or in the design of anti-smoking propaganda. There are three limitations in the data presented on smoking and personality that should be borne in mind in assessing the possible outcome of such an approach. Although a temporal relationship between personality scores and smoking has been demonstrated, this does not necessarily imply any causal link. If the observed relationship were to be due, for example, to some third variable such as social class, use of the personality data might not be of any particular benefit. Examination of the data, in fact, ruled out social class as the underlying explanatory variable in this population, but other non-causal explanations could be suggested. A

Table VIII

PROPORTION OF MEN SMOKING AT BOTH 16 AND 20 YEARS, WHO HAD GIVEN UP CIGARETTES BY THE AGE OF 25 ANALYSED BY CONSUMPTION, EXTRAVERSION, AND NEUROTICISM

Daily Cigarette Consumption at 20 Years	Extraversion at 16 Years	Neuroticism At 16 Years					
		Low (0-5)			High (6-12)		
		Observed Proportion	Proportion from Logit Analysis	N	Observed Proportion	Proportion from Logit Analysis	N
1-10	High (9-12)	0·50	0·47	18	0·26	0·32	19
	Low (0-8)	0·17	0·20	24	0·19	0·12	16
11-20	High (9-12)	0·32	0·35	31	0·23	0·22	47
	Low (0-8)	0·14	0·13	35	0·07	0·07	43
21+	High (9-12)	0·22	0·13	9	0·06	0·07	16
	Low (0-8)	0·00	0·04	8	0·00	0·02	13

Goodness of fit χ^2 (estimates from logit analysis to observed data) = 2·8 with 7 degrees of freedom

further problem is suggested by the importance of consumption, in addition to personality, in predicting whether or not the habit will be given up by 25 years. Factors such as the work and social environment of the young adults are likely to affect their level of consumption, and these may confound any attempt to apply the results of this paper. A further factor is that the single birth week of the survey sample does not allow any test of the way in which the results can be generalized across age groups.

The extent to which these restrictions limit the usefulness of the results in this paper will, until tested, be a matter of personal judgement, but even within the narrow band of uncontroversial generalization, some practical application is apparent. The survey members completed the personality questionnaire when they were 16 years old, an age which in 1962 fell one year after the earliest school leaving, but now includes all young people as a captive audience in the classroom. Smoking advice is at present available to some of these young people and this paper suggests that recognition of the different, and additive, relationships between smoking and the two personality dimensions may help to make this advice more effective.

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